

A test for evaluating the downscaling ability of one-way nested regional climate models: the Big-Brother Experiment

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The purpose of this research is to evaluate the downscaling ability of one-way nesting regional climate models (RCM). To do this, a rigorous and well-defined experiment for assessing the reliability of the one-way nesting approach is developed. This experiment, baptized the Big-Brother Experiment (BBE), is used for addressing some important one-way nesting issues.

The BBE consists in first establishing a reference virtual-reality climate from an RCM simulation using a large and high-resolution domain. This simulation is called the "Big Brother." This big-brother simulation is then degraded toward the resolution of today's global objective analyses (OA) and/or global climate models (GCM) by removing the short scales. The resulting fields are then used as nesting data to drive an RCM (called the "Little Brother") which is integrated at the same high-resolution as the Big Brother, but over a sub-area of the big-brother domain. The climate statistics of the Little Brother are then compared with those of the big-brother simulation over the little-brother domain. Differences between the two climates can thus be unambiguously attributed to errors associated with the dynamical downscaling technique, and not to model errors nor to observation limitations. In this talk, we present results of BBEs showing the sensitivity of a RCM to the spatial resolution and temporal update frequency of the lateral boundary conditions.